Report of Break-Out Group 2

Reliability and Uncertainty in Situation Awareness of Network Visualization

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1 OVERVIEW OF PROBLEMS

The problems in reliability and uncertainty in situation awareness of network visualization can be divided into two:

- Reliability/Validity of the presented Network
- Uncertainty of Network Representation

1.1 Reliability/Validity of the presented Network

Reliability or validity of the presented network can have the following problems:

- Sometimes geographical space is irrelevant. F.ex when displaying physical nodes, distances imply meaning unless specified otherwise.
- What is the meaning of the links? Being there does not imply a relationship. F.ex. a link establishes a relationship but the type of relationship should be identified.
- Dynamics of a Node need to be captured to reveal potential interactions (links). Common skills, for example, reveal a potential interaction for synergy of capabilities.
- No link/coordination between academia and the intelligence people. Academic systems do not get to evaluate real (classified) data. There are multi-national and inner service/agency divisions and classification barriers. Indications of sources not included help the user identify the completeness of the presented network model. User may have access to data for that the builder of the network model did not.
- Analyst needs, in defining the users, should be taken into account for network visualization development. Any user of network visualization is also an analyst in the pursuit of making informed decisions based on presented data.

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1.2 Uncertainty of Network Representation

Uncertainty of network representation has the following problems:

- Missing links/false links.
  - An important question is: How is the unknown quantified in relation to the known?
  - An other important question is: Are there any indications of hidden nodes/links based on known nodes (supporting nodes).
  - The answer could help define percentage of revealed network. Considerations of network nodes avoiding link detection should be taken into account.
- What does lack of information implies? This might be:
  - Displayed data is incomplete based on the dynamics of what it is replicating.
  - User of Data may base decisions with assumption that the presented network is a complete representation.
  - How is the percentage of the unknown nodes/links defined so as to be useable information for the user of a network? As in aviation, the unknown is the most dangerous. Lifting the ”fog of war” is knowing where the fog is and how much in relation to the knowns.
- Mis-information
  How are mis-information discovered and dealt with?
- The user’s perception of network properties. In come cases several representations of the roles in the network should be used, f.ex. when splitting information into several perceptions (images) or when using visual variables in a logical way.

2 RECOMMENDATIONS

Working group 2 has the following recommendations:

- Further research is necessary on problems mentioned earlier.
- Contact between users, developers and researchers should be encouraged.
- Define the problem to be solved in ways that even civilian researchers may work on them.
- Better ways to get laundered data to researchers/modellers should be established.
- A clear definition of reliability and uncertainty is needed.

Reliability and uncertainty in situation awareness of Network Visualization

Group 2

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- Mac McMullen
- Zack Jacobson

Overview of Problems

- **Reliability/Validity of the presented Network**
- **Uncertanty of network representation**

Reliability/Validity of the presented Network

1. Sometimes geographical space is irelevant
2. What is the meaning of the links? Being there does not imply a relationship.
3. Dynamics of a Node need to be captured to reveal potential interactions (links).
4. No link/coordination between akademia and the intelligence people. Akademic systems do not get evaluated on real (classified) data.
5. Analist needs, in defining the users, should be taken into accout for network visualization development

Uncertanty of network representation

6. Missing links/false links
7. What does lack of information implies
8. Mis-information
9. Consider the user's perception of network properties

Uncertanty of network representation:

6. Missing links/false links

- *How is the unknown quantified in relation to the known.*
- Indications of hidden Nodes/Links based on known Nodes (supporting nodes). Helps define percentage of revealed network.
- Considerations of network nodes avoiding link detection.

7. What does lack of information implies

- *Displayed data is incomplete based on the dynamics of what it is replicating.*
- *User of Data may base decisions with assumption that the presented network is a complete representation.*
- *How is the percentage of the unknown nodes/links defined so as to be useable information for the user of a network? As in aviation, the unknown is the most dangerous. Lifting the ”fog of war” is knowning where the fog is and how much in relation to the knowns.*

9. The user’s perception of network properties

- In some cases several representations of the roles in the network should be used
  - Splitting information into several perceptions (images)
  - Using visual variables in a logical way

Recommandations

- Further research is nessesary on problems mentioned earlier.
- Contact between users, developers and researchers should be encouraged.
- Define the problem to be solved in ways that even civilian researchers may work on them.
- Better ways to get loundered data to researchers/modellers should be established.
- A clear definition of reliability and uncertainty is needed.